The sections on the metamorphism of minerals, and on the formation of minerals in nature, will be found of great interest to the petrologist. Here are described the effects on minerals of heat, of gases at high temperatures, of fusion, of fused magmas, of water containing carbonic acid, &c. In the last section, dealing with the composition and constitution of minerals, the present imperfect state of our knowledge is brought prominently to light. The battle is still being fought between the so-called chemical, liquid, and crystal molecule; between constitutional and empirical formulæ. Mineralogists are beginning to understand that it is impracticable to attempt to use for complicated minerals principles which are only applicable to volatile organic compounds, and the idea is gaining ground that many minerals are molecular compounds only capable of existing in the solid state, the crystal molecule being built up of different chemical molecules.

The author intends to supplement the present work by another, entitled "Chemical Mineralogy," in which the composition, synthesis, &c., of each individual mineral will be treated more particularly. The present volume is intended as quite a general treatise on the subject of mineral chemistry; in fact, we cannot help thinking that in many parts the treatment is far too general, and that the book has been partially sacrificed for the sake of the volume that is to follow. The value of the book is increased by the lists of references to the literature which precede each section.

G. T. P.

OUR BOOK SHELF.

Bush Friends in Tasmania: Native Flowers, Fruits, and Insects, drawn from Nature, with Prose Descriptions and Illustrations in Verse. By Louisa A. Meredith. Executed by Vincent Brooks, Day, and Son. (London and New York: Macmillan and Co., 1891.)

UPWARDS of thirty years ago Mrs. Meredith gave the world a volume containing admirable coloured figures of a selection from the many beautiful plants and insects that inhabit her island home, Tasmania; and now, in the evening of a long life, she has travelled to the old country to publish a second volume, which is to be the last. Her purpose achieved, she "hopes to return and end her days among her children in that pleasant colony," which has given a brighter home to so many of our kith and kin. Lovers of the beauties of Nature in this country will find much pleasure and instruction in this second volume from that talented lady's pen and pencil, and will be able thereby to form some conception of the totally different kind of vegetation from our own that clothes this remote southern island, as well as the great Australian country, for it is only a part of the same flora. To the colonists themselves the book will be even more attractive, as a means of becoming acquainted with the names and affinities of the beautiful objects with which they are surrounded. It will also, it is to be hoped, teach them to prize and preserve these rare and precious gifts. Like all true lovers of Nature, Mrs. Meredith deplores the wanton destruction of rare flowers near Hobart by thoughtless or greedy persons whose only aim seems to be quantity.

The botanical part of Mrs. Meredith's book is perfectly trustworthy, having been scrutinized by so eminent an authority as Sir Joseph Hooker; and Prof. Westwood furnished the names of the insects.

Some of the poems have a special interest in connection with the early history of the settlement of Tasmania. Notably an "Old Story" of 1834, which narrates the massacre by aborigines of a whole family—father, mother, and seven children.

The Elementary Geometry of Conics, with a Chapter on the Line Infinity. By C. Taylor, D.D. (Cambridge: Deighton, Bell, and Co., 1891.)

DR. TAYLOR'S "Geometry of Conics" is so well known, and has met with such acceptance—this is the seventh edition, revised—that we are not called upon to give a detailed account of it. Two additions, however, claim a brief notice. A new chapter (xii.) contains "a course for beginners," in which students who prefer to take the three conics separately have a selection of articles, from the text, indicated for a first reading. Further, a set of duplicate proofs is given in outline, the completion of which is left to the reader. The other novelty (chapter xi.) is "a new treatment of the hyperbola." This is the expansion of a paper which the author read before the Association for the Improvement of Geometrical Teaching, in January 1890, and of which the President (Prof. Minchin) is reported to have said: "One thing that struck him about the paper was, that Dr. Taylor arrived at points on the curve in a very much more rapid and simple way than any he had previously known of." The author remarks that it is in accordance with the historical order to draw the asymptotes before tracing the curve, for the hyperbola seems to have been discovered from its "equation" (A.I.G.T. Report, 1890, p. 12).

It is somewhat remarkable that Dr. Taylor does not give a proof of this equation. We append one. Taking his figure on p. 103, we draw the second asymptote. Now draw PM parallel to C*p*, cutting the axis in K, and the second asymptote in M: then,

$$\begin{aligned}4\mathrm{CM}\,.\,\mathrm{MP} &= 4\mathrm{MK}\,.\,\mathrm{MP} = (\mathrm{MP}+\mathrm{MK})^2-(\mathrm{MP}-\mathrm{MK})^2\\ &= \mathrm{C}p^2-\mathrm{KP}^2 = \lambda^2(p\mathrm{N}^2-\mathrm{PN}^2)\ \text{(where } \lambda \text{ is a constant)}\\ &= \lambda^2(\mathrm{S}p^2-\mathrm{SP}^2)\\ &= \lambda^2(\mathrm{S}p^2-p\mathrm{Y}^2) = \lambda^2\,.\,\mathrm{SY}^2 = \mathrm{C}a^2 = a^2+b^2.\end{aligned}$$

Again, let PQ be any chord meeting the asymptotes in *p*, *q*; and let Q*l*, P*m*, parallel to C*p*, C*q* respectively, meet those lines in *l*, *m*. Then we have

$$\frac{\mathrm{P}q}{\mathrm{C}m} = \frac{\mathrm{P}p}{pm} = \frac{pq}{\mathrm{C}p} = \frac{\mathrm{Q}q}{\mathrm{Q}l},$$

$$\therefore\quad \frac{\mathrm{P}q}{\mathrm{Q}q} = \frac{\mathrm{C}m}{\mathrm{Q}l} = \frac{\mathrm{C}l}{\mathrm{P}m} = \frac{p\mathrm{Q}}{\mathrm{P}p};$$

hence

$$\mathrm{P}p = \mathrm{Q}q, \text{ and } \mathrm{P}q = p\mathrm{Q}.$$

Other properties occur to us, but the above are classic properties of the curve, and the wonder is that Dr. Taylor has not applied his new treatment to obtain them. There is no suggestion that they can be so obtained, either in the book or the original paper as printed in the A.I.G.T. Report.

R. T.

Les Engrais Chimiques. Par Georges Ville. Septième Édition. (Paris: M. Engel, 1890.)

THIS is a new edition of the author's lectures on chemical manures, which were first published in 1868, and which have been translated into seven languages. An English edition, by Mr. Crookes, was published in 1879. The sixth French edition has been out of print for about ten years, and during that time the price of chemical manures has considerably declined, on an average about 40 per cent. On this account the author has introduced, at the end of the volume, a chapter containing new formulæ for mixed manures, based on considerations of market value and more complete knowledge of the requirements of

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crops. Thus, potassium chloride replaces potassium nitrate in the manure for leguminous plants, and in some cases a mixture of potassium chloride and ammonium sulphate replaces potassium nitrate; and a few other alterations are suggested in the treatment of various crops. Thomas's basic cinder is not mentioned as a source of phosphoric acid. The lectures themselves, and some controversial matter, are reprinted in their original form, and but little new matter is added.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Bird-Collections in the Oxford University Museum.

DURING a recent visit to Oxford I took the opportunity of examining the collection of birds in the University Museum, and beg leave to offer a few remarks upon its condition.

First, as regards the mounted specimens, there are three series belonging to this category:—

(1) The general series in the Central Court. This numbers about 1100 specimens, which are contained in twelve cases, placed in opposite rows of six each, but rather mixed up with mammals, shells, and other objects. The specimens are arranged according to Gray's "Genera," and in most cases correctly named. But many of them are in bad order and not well set up, and should be replaced by fresh examples. The whole series requires renovation and rearrangement, according to some modern system, and the orders and families should be designated by labels, and distinctly separated one from another.

(2) The collection of Arctic birds formed by Mr. J. Barrow, F.R.S., and presented to the Museum by that gentleman. This interesting collection, which has been well described by Mr. Harting in the *Ibis*, is placed in the gallery. It is well mounted and correctly named. But it is a question whether it is desirable to keep it apart from the general series.

(3) The British series, also placed in the gallery, which is in fair order, although it also requires revision and rearrangement according to some modern system. It ought not to be difficult to find some member of the British Ornithologists' Union to undertake this task, provided that the authorities will allow him a "free hand."

Besides the mounted specimens, there are, as I understand, about 4000 skins of birds, most of which are "put away" in boxes in various parts of the building. Of these, the only portion that I was able to see was the Bornean collection formed by Mr. Everett, and partly described by Dr. Bowdler Sharpe in the Zoological Society's Proceedings. These are placed in some drawers in the main hall. The other skins are stated to be "boxed up," and are kept partly in a room on the ground floor, and partly in some "upper chamber," to which no ready access is possible.

I venture to suggest that one of the side rooms in the Museum should be cleared of its contents, and devoted entirely to the bird-skins, and that they should be arranged there in cabinets, so as to be accessible to the ornithologist. It is hardly right for a great and rich University to accept collections from persons who, in the words of the late Prince Bonaparte put forward on a similar occasion, "croyant qu'ils travaillaient pour la science, non pas travaillés que pour les mites." I may add that any assistance that I can give in carrying out this reform will be most gladly rendered. P. L. SCLATER.

3 Hanover Square, London, W., September 4.

Variation and Natural Selection.

IN Prof. C. Lloyd Morgan's Presidential address to the Bristol Naturalists' Society, on "The Nature and Origin of Variations" (of which he has kindly sent me a reprint from the Society's Proceedings), there are one or two points on which there seems to me to be a slight misconception; and as the difficulties suggested have probably occurred to other naturalists, I wish to make a few observations in the hope of throwing a little light on this obscure subject.

After referring to the proofs of the variability of species in a state of nature which I have adduced in my "Darwinism" (to which proofs Prof. Lloyd Morgan has made some important additions in his recent work on "Animal Life and Intelligence") he remarks:—"We have been apt to suppose that a species is so nicely adjusted to its surrounding conditions that all variations from the type, unless of a very insignificant character, would be rapidly and inevitably weeded out. This, it is clear, is not true at any rate for some species." And a little further on, after discussing the question whether variations in all directions occur in equal proportions—an equality which does not appear to me to be at all necessary, or to have been ever suggested as occurring—he says: "And the candid biologist must, I think, admit that the evidence in Mr. Wallace's third chapter, while conclusive as to the occurrence of variations, gives on analysis little or no evidence of any selective agency at work."

The difficulties here stated appear to me to depend, chiefly, on not taking account of some important facts in nature. The first fact is, that the struggle for existence is intermittent in character, and only reaches a maximum at considerable intervals, which may be measured by tens of years or by centuries. The average number of the individuals of any species which reach maturity may be able to survive for some years in ordinary seasons or under ordinary attacks of enemies, but when exceptional periods of cold or drought or wet occur, with a corresponding scarcity of certain kinds of food, or greater persecution from certain enemies, then a rigid selection comes into play, and all those individuals which vary too far from the mean standard of efficiency are destroyed.

Another important consideration is that these epochs of severe struggle will not be all of a like nature, and thus only one particular kind of unbalanced or injurious variation may be eliminated by each of them. Hence it may be that for considerable periods almost all the individuals that reach maturity may be able to survive, even though they exhibit large variations in many directions from the central type of the species. During such quiescent periods, the chief elimination will be among the young and immature. Thus, with birds probably nine-tenths of the destruction occurs among the eggs and half-fledged young, or among those which have just escaped from parental care; while those which have survived to breeding age only suffer a slight destruction in ordinary years, and this may occur partly among the less experienced, partly among those which are old and somewhat feeble.

The severe elimination that occurs in the earlier stages may be thought to be accidental, but I doubt if it is really so except in a very small degree. The protection and concealment of the eggs and young in the nest will depend chiefly on the mental qualities or instincts of the parents, and these will have been always subject to a rigid selection owing to the fact that those with deficient instincts will leave fewer offspring to inherit their deficiency. And with young birds of the first year there will be an equally rigid selection of the incautious, and of those who are deficient in any of the sense-perceptions, or are less strong and active than their fellows.

The proof that there *is* a selective agency at work is, I think, to be found in the general stability of species during the period of human observation, notwithstanding the large amount of variability that has been proved to exist. If there were no selection constantly going on, why should it happen that the *kind* of variations that occur so frequently under domestication never maintain themselves in a state of nature? Examples of this class are white blackbirds or pigeons, black sheep, and unsymmetrically marked animals generally. These occur not unfrequently, as well as such sports as six-toed or stump-tailed cats, and they all persist and even increase under domestication, but never in a state of nature; and there seems no reason for this but that in the latter case they are quickly eliminated through the struggle for existence—that is, by natural selection.

One more point I will advert to is Prof. Lloyd Morgan's doubt, in opposition to Mr. Ball, "whether a thicker or thinner sole to the foot is a character of elimination value, whether it would determine survival or elimination, and make all the difference between passing or being plucked in life's great competitive examination." This seems to me to be a rather unfortunate objection, since, in constantly recurring circumstances during the life of a savage, this very character must be of vital importance. Whether on the war-path, or in pursuit of game,

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